WEATHER ON THE NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—In extreme northern waters of the North Pacific, pressure conditions showed a remarkable change from those in the preceding month. The Aleutian LOW, which was centered as a deep depression over the Gulf of Alaska in October, retreated with much decrease in energy to the central and western part of the Bering Sea in November. At Kodiak and Juneau, where the average pressure had been 5 or 6 millibars (0.15 to 0.19 inch) below the normal in October, it had risen to 7 or 8 millibars (more than 0.20 inch) above the normal in November. High pressure for the month continued southward along the coast to the United States, and at Tatoosh Island it was 4 millibars (0.12 inch) above the November long-term average.

Along the belt of high pressure, which extended from California across the ocean to China, the barometer, as indicated by San Francisco, Midway Island, and Titijima, was close to its November normal; but at Honolulu the average pressure was 3 millibars, or nearly a tenth of an inch, below the normal. So great a departure in an average is rare at this island station.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, November 1940, at selected stations*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Barrow	1,014.8	−0.8	1,034	24, 25	985	20
Dutch Harbor	1,005.1	+3.1	1,026	21	967	13
St. Paul	1,002.6	+.6	1,024	22	974	19
Kodiak	1,008.3	+7.3	1,029	21	981	15
Juneau	1,015.6	+7.8	1,029	11	997	24
Tatoosh Island	1,019.0	+4.1	1,032	25	986	7
San Francisco	1,019.6	+.6	1,027	24	1,013	1
Mazatlan	1,012.0	−.2	1,014	16, 18, 23	1,009	6
Honolulu	1,013.5	−3.1	1,019	2	1,007	20
Midway Island	1,019.0	+.4	1,027	15	1,010	8
Guam	1,009.7	−1.5	1,014	10, 14	956	3
Manila	1,010.1	−.1	1,013	10, 11, 30	1,007	26
Hong Kong						
Naha	1,017.7	+2.5	1,024	10	1,013	7, 23, 24, 29
Titijima	1,016.2	+1.0	1,025	5	973	9
Petropavlovsk[1]	1,002.8	−2.3	1,022	12	980	21

[1] For 21 days.

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observations.

Extratropical cyclones and gales.—A considerable amount of stormy weather occurred on the North Pacific this month, but, so far as ships' reports indicate, there was a conspicuous absence of gales of hurricane or near hurricane force due to cyclones of middle and higher latitudes. On 7 days of the month force-10 gales were reported near or well north of the 40th parallel. The high velocities on 3 of these days, the 4th, 5th, and 24th, occurred off the coast of northern California and Oregon. One of the gales occurred on the 3d, near 42° N., 153° E., in the extreme southern quadrant of a deep cyclone central in the western Bering Sea, and the remaining 3, on the 13th, 22d, and 23d, were encountered in much higher latitudes, near the Aleutians or on the lower Gulf of Alaska.

As the average position of the Aleutian LOW this month was in the Bering Sea, it may be inferred that the centers of a predominant number of the cyclonic disturbances moved in upper latitudes, with some storms entering the Bering Sea from Kamchatka, and others from southwest of the Aleutians. Four of the cyclones were reported as attended by gale winds along the western part of the northern trans-Pacific routes: one on the 3d, east of northern Japan; one over the Aleutians on the 13th; one near the northern Kuril Islands on the 15th; and the fourth from near southern Kamchatka on the 25th to the waters south of the western Aleutians on the 27th and 28th. In the storms of the 13th and the 25th to 28th, pressures fell to considerable depths. On the 13th, near 51° N., 175° E., the American steamer *S. C. T. Dodd* had a barometer of 973.2 millibars (28.74 inches), with a north gale of force 10. Dutch Harbor on this date had the lowest known barometer reading of the month in northern waters, 967 millibars (28.56 inches). On the 28th and 29th the *S. C. T. Dodd* reported westerly gales of force 9, with lowest barometer, 972.2 millibars (28.71 inches), near 46° N., 178° E., on the 29th.

Mention may be made of three cyclones of the extratropics that formed near midocean and pursued northerly courses. One appeared central on the 9th near 32° N., 155° W. By the 11th it had entered the region traversed by ships along the Hawaiian-California routes, and on that date several vessels within the area of 28° to 40° N., 138° to 145° W., encountered south to southeast gales of force 8 to 9, with moderately depressed barometers. On the 13th this cyclone amalgamated with another, eastbound, cyclone to the northward.

On November 20 a depression appeared to the westward of the principal group of the Hawaiian Islands. It moved rapidly north-northeastward, gaining in intensity, and was central near 45° N., 150° W., on the 22d. Near the center on that date one vessel reported a southwesterly gale of force 8, with barometer fallen to 993.2 millibars (29.33 inches). By the morning of the 23d the storm had advanced to a position west of the Queen Charlotte Islands, and on the following day had turned northwestward into the Gulf of Alaska. The cyclone was apparently at its stage of greatest severity during the night of the 22d–23d, when the U. S. A. T. *Chirikof*, southbound from Seward, ran into a northeasterly gale of force 10, lowest barometer 986.8 millibars (29.14 inches), near 52° N., 143° W.

On the 22d to 25th scattered gales of force 8 to 9 were reported within the area 37° to 43° N., 165° to 172° W., caused by a cyclone that seems to have formed in the vicinity and to have had a very slow northeastward movement before its disappearance on the 27th. On the 25th, with a north gale of force 9, near 43° N., 168° W., the lowest barometer observed was 982.4 millibars (29.01 inches), read on the Japanese M. S. *Huzisan Maru*.

In American coastal waters, from northern California to Vancouver Island, stormy weather occurred on several days, but more particularly, along the greater extent of the coast, on the 4th and 5th, with gales of force 10 reported off California and Oregon and of force 9 off northwestern Washington and Vancouver Island. Relief Lightship No. 92, at the entrance to the Strait of Juan de Fuca, experienced gales of force 8 to 10 on the 4th, 7th, 13th, and 23d, while on the 24th the lower Oregon coast was swept by a southerly gale of force 10.

Tropical cyclones.—Hereunder is a report by the Rev. Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., of a typhoon of the Far East from November 2 to 10, which was of serious consequences to the island of Guam, and of a depression later in the month. The American S. S. *Chickasaw City* passed through the Guam typhoon, battling winds of force 11 to 12 from about 8 a. m. of the 3d until about 6 a. m. of the 4th, lowest barometer 961.7 millibars, 28.40 inches, at 6 p. m. of the 3d.

In the American Tropics, the American S. S. *Wacosta* ran into a cyclone of considerable intensity on the 1st and 2d, while at some distance southwest of Manzanillo, Mexico. The vessel's highest wind velocity was of force 10 from the northeast, lowest barometer, 1,004.7 millibars (29.67 inches), in 15°18′ N., 107°18′ W., at 10 p. m. of the 1st. Northeast to southeast gales of decreasing intensity continued until about 6. a. m. of the 2d. The cyclone, apparently blocked from northward movement by high pressure, took an unusual southwesterly course and appears to have persisted until the 3d, although no strong winds were reported after the 2d.

Tehuantepecers.—In the Gulf of Tehuantepec, norther-type gales of force 7 were reported on the 4th and 5th, and of force 10 on the 15th, 16th, and 17th.

Fog.—Isolated occurrences of fog were observed on the 3d and 4th about midway along the San Francisco-Honolulu route; on the 8th and 9th south of the Aleutian Islands; and on the 9th to 11th near 45° N., 140° to 150° W. It was reported on 7 days off or near the California coast, and on 1 day off the middle coast of Lower California.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST

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Typhoon, November 2–10, 1940.—The weather maps of November 2 had indications of a disturbance somewhere southeast of Guam. The fall in pressure shown on the afternoon map indicated clearly that this disturbance was of typhoon strength and the extra evening observations supplied by Mr. Lewis Stroup, stationed at the Commercial Pacific Cable office in Guam, showed that the storm was approaching the locality of the island. On November 3, the center passed close to and south of the island, moving in a northwesterly direction. It continued along a course, either northwest or west-northwest, to the regions near longitude 135° E., where it inclined to the north. November 6 and the two following days, the center recurved to the northeast. November 9, it was located very close to and southeast of the Bonins. A few ships' reports of November 10, showed that the center was far to the east-northeast of the Bonins (Ogasawaras), moving east-northeast or northeast toward the date line.

The typhoon center passed very close to and south of the office of the Commercial Pacific Cable Company in Guam. It is possible that the center passed over the island itself, but no reports that any of the villages on the island experienced the calm center have reached this office up to the time of writing this article. The minimum pressure occurred at 1.45 p. m. Guam time, and was 716.69 mm. (955.5 mb.), gravity correction applied. The winds were east at the time, with a velocity estimated over 125 m. p. h. For about 10 or 15 minutes, about the time of the minimum, according to Mr. Stroup, there was a lull in the wind, decreasing to about 80 m. p. h. (estimated). About 20 minutes before the minimum, the barometer was pumping, which continued until after the barometer reached its minimum. Mr. Stroup supplied the Observatory with many observations as the storm progressed and the series is given here, but in a brief form:

November 2, at 8 p. m., Guam time, pressure 750.60 mm. (1000.7 mb.) winds NNE, force 6; 10 p. m., 750.18 mm. N winds, 30 m. p. h.; midnight, 748.68 mm., NNW winds, 30 m. p. h.; November 3, 4 a. m., 745.10 mm., N winds, 48 m. p. h. squally; 5 a. m., 743.90 mm. N winds, 42 m. p. h.; 6 a. m., 743.80 mm., N winds, 42 m. p. h.; 7 a. m., 742.70 mm., NNE winds, 50 m. p. h.; 8 a. m., 741.83 mm., NNE winds 60 m. p. h., raining hard last two hours; 9 a. m., 740.68 mm. (987.5 mb.), NNE winds, 70 m. p. h.; 10 a. m., 737.28 mm. (983.0 mb.), NNE winds, 80 m. p. h.; 11 a. m. 731.65 mm. (975.5 mb.), NNE winds, 108 m. p. h.; anemometer ceased recording but cups can be seen revolving; noon, 724.62 mm. (966.1 mb.), NNE winds estimated more than 125 m. p. h.; 12.15 p. m., winds definitely NE; approximately 1.15 p. m. wind has changed to E, anemometer mast is down; approximately 1.25 p. m. 716.86 mm. (955.8 mb.) wind shifting ENE to E, terrific, barometer pumping; 1.45 p. m., minimum pressure 716.69 mm. (955.5 mb.) (28.22 inches), wind E terrific, then notably diminishing and becoming gusty; 2 p. m., 717.93 mm. (957.1 mb.), E winds, hurricane force; 3 p. m., 720.04 mm. (960.0 mb.) E to ESE, violent. After 3 p. m. no more extra observations were requested. The anemometer cups, it may be added, had been in use on station since 1918.

The loss of life was very small, considering the duration of these strong winds. From private sources, the writer learned that about five persons were missing after the storm, and it is supposed that they were drowned. Besides, two or three persons were killed when trees crashed down upon their houses. The property loss was enormous. Very few buildings were left undamaged. The greatest damage occurred with the east quadrant winds during the afternoon, after the center had passed.

On November 9, when the center was not very far from the Bonins, pressure at that station (the morning observation) was 729.5 mm. (972.6 mb.) with north-northwest winds force 5. At this time the storm center was moving east-northeast or northeast after recurvature.

The upper winds over Guam before the typhoon arrived were from the east quadrant. October 29 and following days, gradually backing, day after day, to the northeast and finally, on November 2, morning ascent, becoming north and north-northeast. Velocities were seldom over 30 k. p. h. before November 1, and never over 40 k. p. h. until after November 1, morning ascent. On the morning of November 2, the upper winds, as reported from the Navy station, were as follows—200 m., direction 10°, velocity 47 k. p. h.; 500 m., 10°, 49 k. p. h.; 1,000 m., 20°, 50 k. p. h., 1,500 m., 20°, 42 k. p. h. 2,000 m., 30°, 6 k. p. h. Balloon obscured. (Direction 360°, N—90° E, etc.) Very strong southeast quadrant winds were reported November 4 and 5 after the storm center had passed.

Over the Philippines, at Zamboanga, there was a shift to the southwest quadrant, the velocities never reaching 30 k. p. h., October 30 and 31. It seems as though there was a tendency to change to the southwest because of the distant forces which caused the typhoon to form. November 2 and the following days, Zamboanga again had east quadrant winds aloft, but changing to the southwest and northwest quadrants just when the typhoon center was recurving (November 5 and 6). Northeast and east quadrant winds prevailed over the other Philippine stations. None of the other reports at hand seem to have any interesting aspects to be mentioned. However the data from Netherlands East Indies and the Straits Settlements (which cannot be received by radio at the Observatory) should show more points of interest.

As this is written, November 20, it must be remarked that since late in September 1940, there has not been any typhoon close to the Philippines, excluding a small,